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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/644,827	08/21/2003	Takeshi Fukuda	Q76740	6185
23373	7590	10/12/2004	EXAMINER	
SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037			LEPISTO, RYAN A	
			ART UNIT	PAPER NUMBER
			2883	

DATE MAILED: 10/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/644,827

Applicant(s)

FUKUDA ET AL.

Examiner

Ryan Lepisto

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 24 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 9/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments filed 29 September 2004, with respect to the rejection(s) of claim(s) 1-11 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of newly found prior art.

### *Claim Objections*

2. **Claims 10 and 11** are objected to because they depend on cancelled claim 3.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. **Claims 4-8** are rejected under 35 U.S.C. 102(e) as being anticipated by Borrelli et al (US 2002/0076655) (Borrelli). Borrelli teaches (Figure 1) a method of forming an optical waveguide in the interior of a pure silica glass (Corning 7980 glass) (paragraph 0054) comprising: focusing less than 150 fs laser pulses (2) on the glass (4) to form a high refractive index region (paragraph 0002), wherein the diameter (end of paragraph 0006) and aspect ratio or shape (paragraph 0049) of the diameter of the optical waveguide is controlled by changing the peak power (in this case using filters between

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40 and 800 mW, which is less than  $8.7 \times 10^{11}$  W/cm<sup>2</sup> (paragraph 0006)) and the pulse width, where the pulse width is preferable in a range between 40 fs to 60 fs, which is less than 490 fs, (paragraph 0046) of the femtosecond laser pulses (2) at the focal point (3) (paragraph 0038).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1-2 and 9-11** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Borrelli and **Dugan et al (US 2003/0035640)** (Dugan).

Borrelli teaches the limitations described above used to reject claims 4-8 above.

Borrelli does not teach expressly laser pulse widths in the range of 210 to 420 fs or the diameter of the waveguide in the range of 10 to 14  $\mu$ m or an aspect ratio of 0.9 to 1.1.

Borrelli does teach in example 8, using a 60 fs pulse width (paragraph 0074) to accomplish a 3  $\mu$ m diameter waveguide (paragraph 0074). Borrelli further teaches a pulse width not greater than 420 fs (40 – 50 fs (paragraph 0072), a peak power of less than  $8.7 \times 10^{11}$  W/cm<sup>2</sup> (paragraph 0006) and being able to create an irregular-shaped waveguide (paragraph 0049). A waveguide with an aspect ration of between 0.9-1.1 is obvious to one of ordinary skill in the art to be slightly irregular in shape.

Dugan teaches a method of trimming a waveguide with femtosecond laser pulses to change the index of refraction where the size of the focal point of the laser is adjusted by changing the pulse width (paragraphs 0041-0042).

Borrelli and Dugan are analogous art because they are from the same field of endeavor, creating waveguides using femtosecond laser pulses to change the index of refraction of silica.

Therefore, it would have been obvious one of ordinary skill in the art to increase the pulse width to achieve a different size focal point as taught by Dugan to create a larger diameter waveguide in the range of 10 to 14  $\mu\text{m}$ .

The motivation for doing so would have been to enlarge the confocal region of the laser beam (Dugan, paragraphs 0041-0042).

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Miura et al (US 6,154,593) is still relevant per last action even though it is not relied upon in this action.
- Aitken et al (US 6,573,026) teaches femtosecond laser writing of glass as taught by Borrelli and is similar to applicant's disclosure.
- Corning Incorporated, "HPFS Fused Silica KrF Grade", CORNING INCORPORATED, Product Specifications, September 30, 2003,

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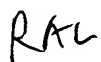
[http://www.corning.com/semiconductoroptycs/products\\_\\_services/pdf/h0607\\_hpfs\\_krf\\_productsheet.pdf](http://www.corning.com/semiconductoroptycs/products__services/pdf/h0607_hpfs_krf_productsheet.pdf). is the specification of the silica material used by Borrelli.

**Contact Information**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan Lepisto whose telephone number is (571) 272-1946. The examiner can normally be reached on M-F 7:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

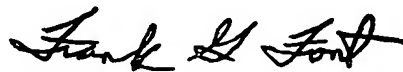
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ryan Lepisto

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Date: 10/8/04



Frank Font

Supervisory Patent Examiner

Technology Center 2800